Thank you very much for your purchase of our product. Please read this operation manual thoroughly to fully understand the functions of this product for ensuring proper use.

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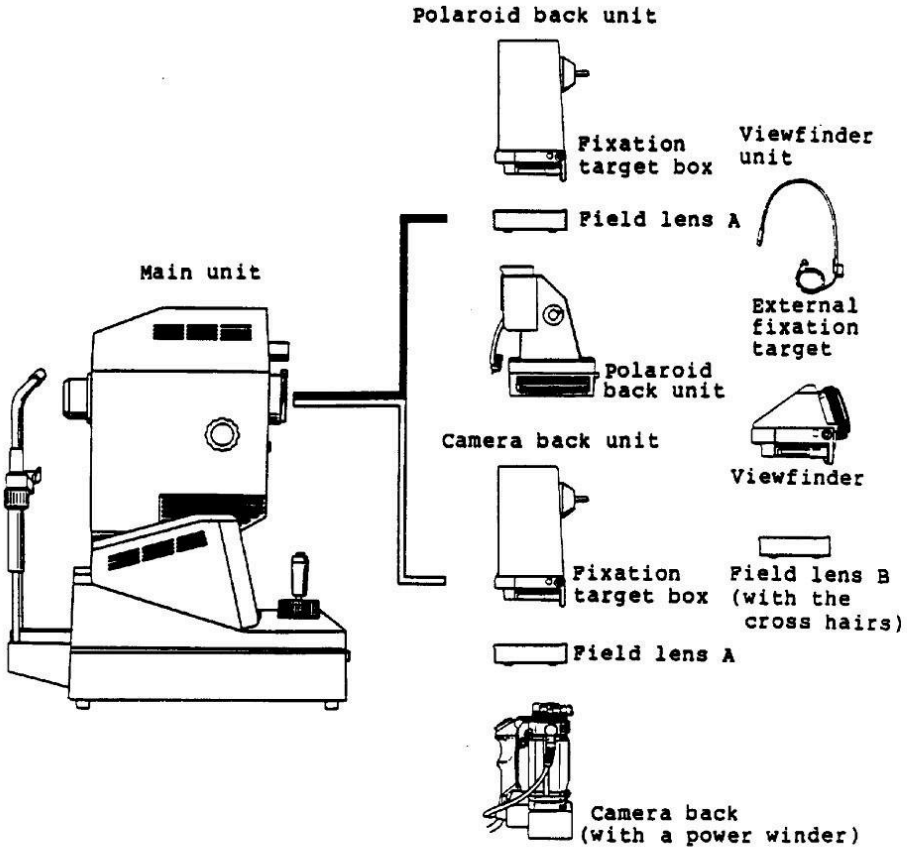
## 1. INTRODUCTION

The CR4-45NM is capable of performing non-mydriatric retinal photography when the main unit is combined with the Polaroid back unit or camera back unit and in addition, is capable of performing the retinal observation through visible light when combined with the viewfinder unit.



**How to Read Operation Manual**

This manual is divided into three sections: (1) Photography by Polaroid back unit, (2) Photography by camera back unit, and (3) Retinal observation by viewfinder unit.

Please refer to the description applicable to the combination of products you have purchased.

**Precautions for Use**

1. Since a strong shock might cause preadjustment disorder, please handle the unit carefully.

2. Be sure to check that there are no stains or scratches on the objective lens before photography, since they may appear on the print as white dots. After photography, place the cap over the lens.

3. This unit is a precision instrument. Avoid high humidity or temperature, and dusty conditions.

4. Be sure not to handle this unit in other manners than those described in this manual.

Installation

1. Install the instrument where it is possible to control the brightness to the degree a newspaper can be barely read (about 5 luxes).

2. Place the instrument on a table.

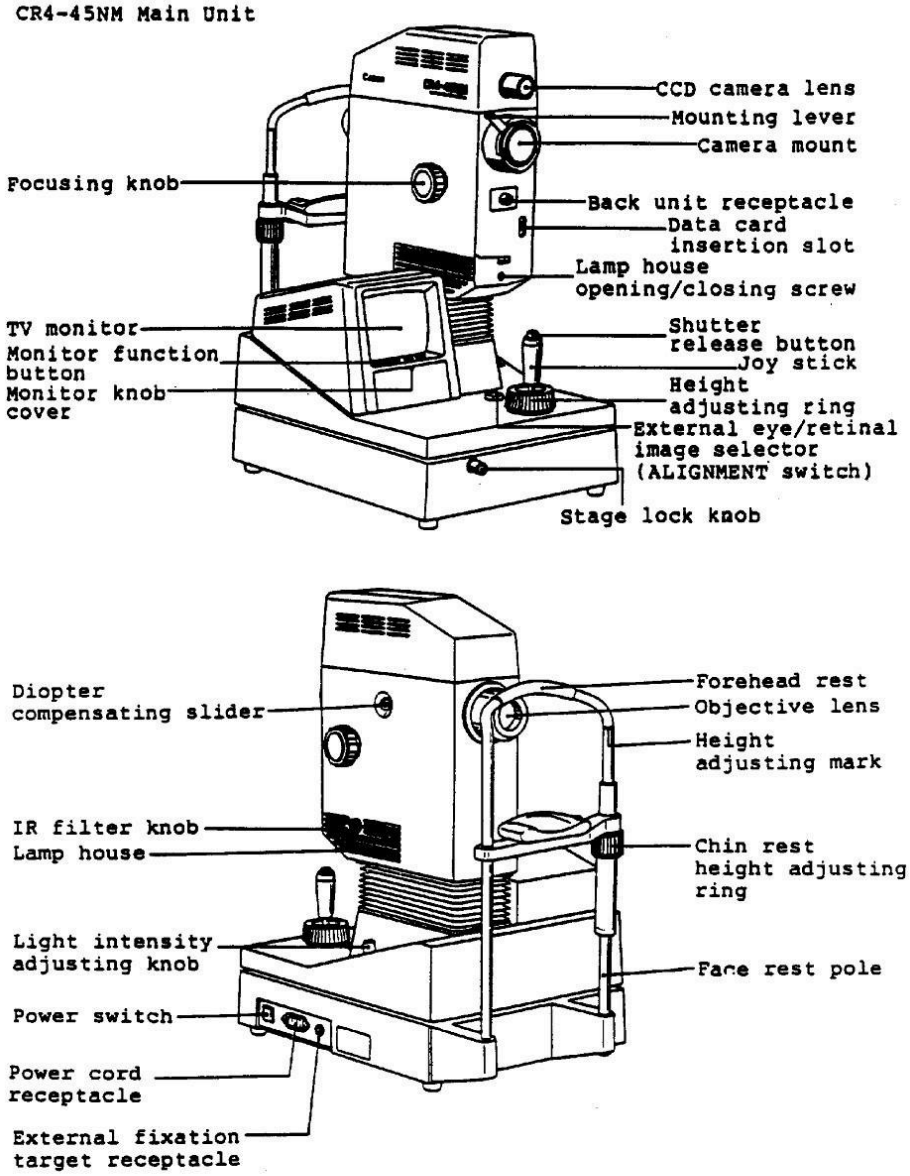
3. Insert one end of the power cable into the instrument.

4. After confirming that the cables are connected properly, insert the power plug for the main unit into the power source.

5. Whenever carrying the instrument, turn off the power. Fix the stage unit by rotating the stage lock knob and move the instrument by holding the stage unit.

## 2. DESCRIPTION OF MAIN UNIT

CR4-45NM Main Unit

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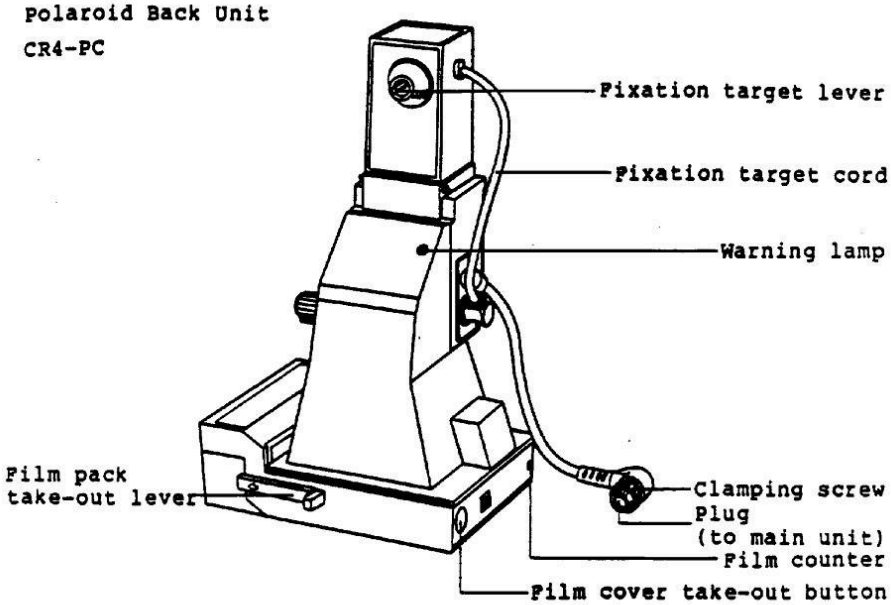
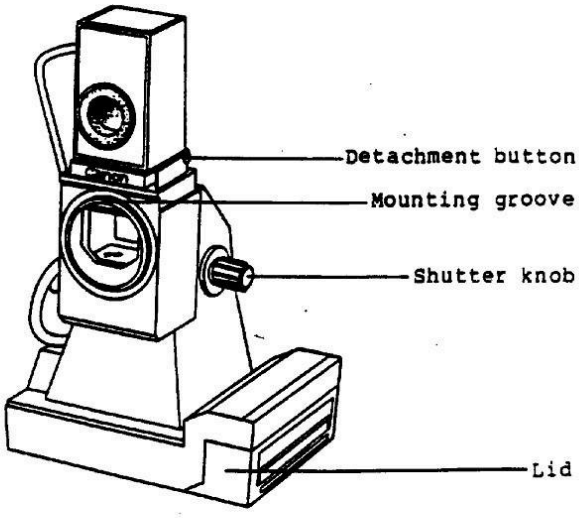
## 3. POLAROID PHOTOGRAPHY

Polaroid Back Unit
CR4-PC



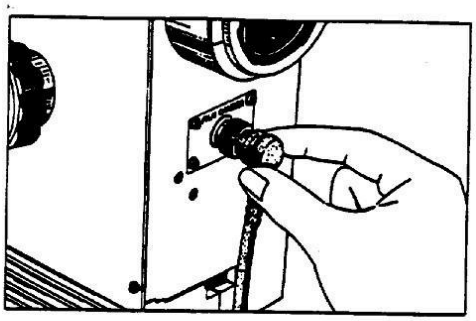



**Attachment/Detachment to/from Main Unit**

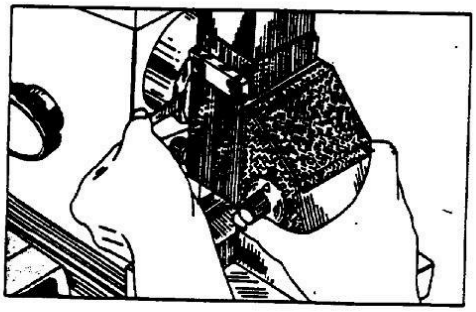
Follow the procedure below to attach the Polaroid back unit to or detach it from the main unit.

1. Turn off the power.

2. Insert the Polaroid back unit plug into the back unit receptacle on the main unit, and tighten the clamping screw by fully turning it clockwise.



3. With the mount groove of the Polaroid back unit aligned to the positioning pin of the main unit, push the Polaroid back unit against the main unit and push the lever down.



4. Detach the Polaroid back unit in the reverse order of the attachment.

**Precautions after Detachment**

Dust may enter into the Polaroid back unit and the main unit if the Polaroid back unit is left as it is after detached. Place the supplied caps over both mounts.

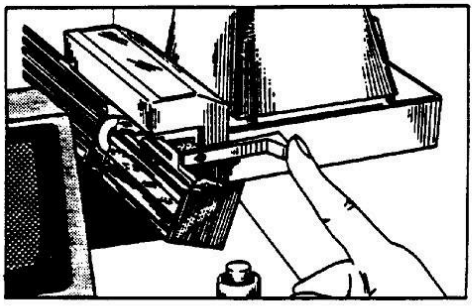
**Film Loading**

The usable film is Polaroid High Speed Land Film 600 or Type 779. Each film pack includes 10 films. Since the Polaroid back unit does not operate if detached from the main unit, a film pack should be loaded in the state with the Polaroid back unit attached to the main unit. Refer to the previous item to attach/detach the Polaroid back unit.

1. Turn on the power.

2. Open the film pack insertion slot.

   - Push the film take-out lever in the direction of the arrow.
   - The lever returns to the original position naturally when the finger is released.



3. Insert the film pack into the Polaroid back unit.

   - The film cover (dark slide) should face upwards.
   - The film tab should face the operator.
   - Insert the film pack fully until the narrow strip portion opens.

4. Close the film insertion slot cover.
   • Push the cover upward from the lower side.

5. Press the film cover take-out button (green) to remove the film cover.

**Chin Rest Paper Attachment**

When attaching the chin rest paper, follow the procedure below:

1. Pull up 2 retaining pins.

2. Insert the retaining pins into the left and right holes on the chin rest papers.

3. Push the retaining pins with chin rest papers down into 2 holes on the chin rest.

**Photography Procedure**

Be careful so that the examinee's pupil does not become small because of the influence caused by the examiner's clothes, the sitting position, and the direction of the monitor.

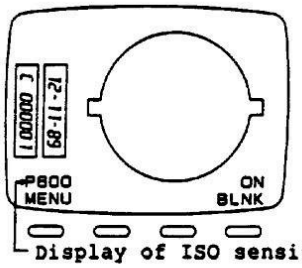
1. Set the shutter knob to 0.

2. Determine light intensity for observation.

   • Set the light intensity adjusting knob to 4. (Standard intensity)

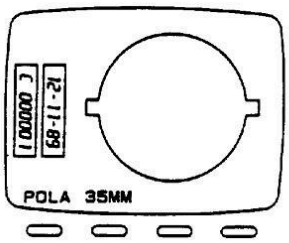
3. Turn on the power.

- The following screen is displayed on the monitor.
- If no photography or switch operations are performed for more than 5 min., the power saving system will work.




Note 1: When the monitor does not display the screen normally, turn off the power once and after about 5 sec., turn on the power again.

2: If the Polaroid back unit is detached from the main unit during the operation and attached again, the following screen will be displayed. Press the button below POLA.



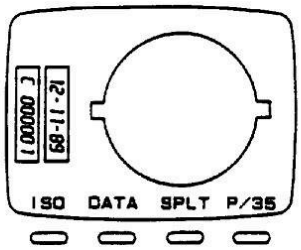
4. Confirm the flash intensity.

- See the screen when the power is first turned on (Step 3, above) to confirm that P600 is displayed at the lower left.

[To compensate flash intensity]

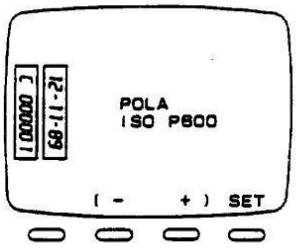
① Press the button below MENU.

- The following screen is displayed on the monitor.




② Press the button below ISO.

- The following screen is displayed on the monitor and "P600" blinks.




- Press the button below "-" to decrease the intensity and the button below "+" to increase the intensity.
- In the respective cases "P600$^{-}$" or "P600$^{+}$" blinks.

③ After setting the flash intensity, press the button below "SET".

- The monitor displays the screen, which appears when the power is turned on, and "P600", "P600$^{-}$" or "P600$^{+}$" blinks at the lower left.
- While the display blinks, the power is being charged. When it lights continuously, then it becomes possible to perform photography.

[In the case P600 is not displayed on monitor although power is turned on]

Follow the procedure below:

① Press the button below MENU.

② Press the button below P/35.

③ Press the button below POLA.

5. Darken the room to a level where a newspaper can be read anyhow (about 5 luxes) or darker.

6. Have an examinee sit.

- When the examinee is in a dark room, the examinee's pupils dilate naturally.

Note: If the examinee puts on spectacles or contact lenses, have him take them off.

7. Adjust height of the chin rest.

- Adjust height of the chin rest by rotating the chin rest height adjusting ring so that the eye to be examined is aligned with the height adjusting mark.

8. Release the lock of the stage.

- Rotate the stage lock knob counterclockwise.

9. Move the main unit to the eye to be photographed.

- Grasping the joy stick, move it to the left or right.

10. By pressing the ALIGNMENT switch, display the external eye image on the monitor.

- Instruct the examinee to look straight ahead.
- The external eye image and pupil alignment mark (⊜ mark) is displayed on the monitor.
- Whenever pressing the switch, the external eye image and the retinal image are displayed alternately.

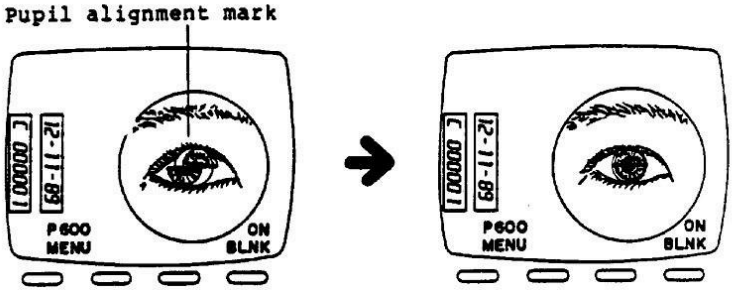
11. Observe the external eye image on the TV monitor, focus the pupil alignment mark, and align the split images with the mark.

- Left/right and height adjustment:

  Left/right adjustment .. Adjust the left/right position by tilting the joy stick to the left/right.

  Height adjustment ..... Adjust the height by rotating the height adjusting ring. If not adjustable sufficiently, rotate the chin rest height adjusting ring.

- Forward/backward adjustment:
  To align the pupil image which is split into the upper and lower parts .. Tilt the joy stick forward/backward.




Note: When the pupil is smaller than the inside ring of the pupil alignment mark, it indicates insufficient mydriasis.

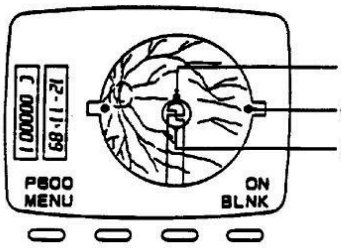
12. By pressing the ALIGNMENT switch, display the retinal image on the monitor.

- The retinal image, split lines, fixation target, and corneal reflection dots are displayed on the monitor.
- If no split lines are seen, the height or left/right adjustment is improper and if no corneal reflection dots are seen, the forward/backward adjustment is improper.

- If the retinal image cannot be seen well, light intensity is insufficient for observation. In this case, adjust light intensity by rotating the light intensity adjusting knob.

13. Precisely adjust the positioning of the retinal image on the monitor so that the entire retinal image is clearly seen.

- Tilt the joy stick forward/backward or left/right so that the left and right flickering corneal reflection dots are most clearly seen.




14. Focus the retinal image.

- By rotating the focusing knob, make the split lines aligned on the monitor.

Causes for unseen split lines

① Insufficient pupil dilation: Dilate the pupil more in a darker room.

② Center of the pupil not aligned with the optical axis of the retinal camera } Repeat steps after Step 8.

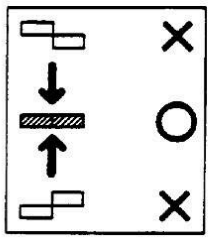
③ Eclipse of illuminating light by the eyelashes or eyelid } Instruct the examinee to open his eye wider.

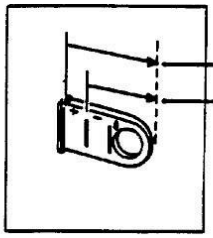
④ Split lines are OFF: Turn on the split lines by displaying the above screen for step 4 and by pressing the button below SPLIT.

Push the diopter compensating slider if it is out.

If the split lines cannot be aligned even when the focusing knob is fully rotated and the split function is on, pull out the diopter compensating slider. (The diopter of the eye to be tested is outside the measurement range of -12 to +15D)

- The split lines disappear.
- In this case, adjust the focusing by rotating the focusing knob so that the retinal image is clearly seen on the monitor.

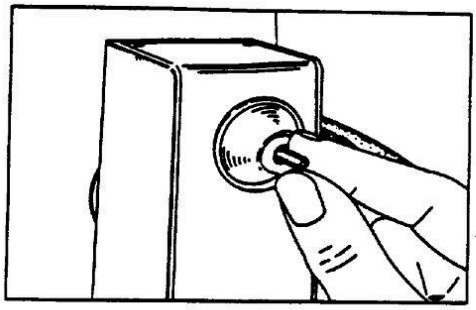





15. Determine the area to be photographed.

- Have the examine look at the fixation target, move the fixation target lever and determine the retinal image area to be photographed on the TV monitor.
- If flares are seen or the corneal reflection dots at the left and right are not seen, adjust the height, forward/backward and left/right positions of the main unit once more.

- If the split lines become misaligned, align them again.



16. Press the shutter release button.

- The flash lamp lights and an exposed picture will come out automatically.
- As neither data nor counter number is printed, describe necessary information onto the available space on the Polaroid picture.

Note 1: While "P600" blinks, the power is being charged and no photography can be made.

2: Be careful not to take the film out forcefully or to block film movement during film advancement.

17. When the photography is completed, turn off the power.

- Place the cap over the objective lens.

**Film Pack Replacement**

When the film is used up, the film counter indicates 0, "CHECK FILM BACK" is displayed on the monitor, and the warning lamp blinks if the ALIGNMENT switch is set for the retinal image. Take out the empty film pack by following the procedure below.

1. Push the film take-out lever fully in the direction of the arrow.

2. Pull the tab and take out the empty film pack.

3. Load a new film pack by following the procedure for film loading.

**Various Display Function**

Alarm Display

In the following conditions, "CHECK FILM BACK" is displayed on the monitor, and the warning lamp blinks if the ALIGNMENT switch is set for the retinal image. In these cases, the flash lamp does not light and no picture will come out.

① When the Polaroid film is used up:
Exchange the film pack with a new one.

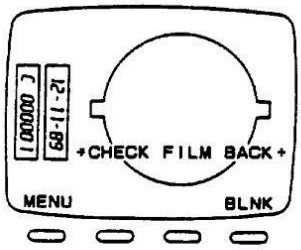
② When a film pack is loaded and the film cover (dark slide) is not removed:
Press the film cover take-out button (green).

③ When the shutter knob is set to "C":
Set it to "O".

④ When the shutter release button is pressed without the camera plug (Polaroid back unit, camera back unit) being connected to the receptacle on the main unit.
Connect the plug to the receptacle.

> Note: If the alarm is still displayed on the monitor although the above problems are solved, contact a Canon representative or distributor.

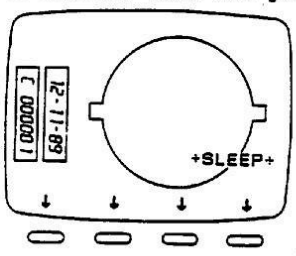
Normally, when the above problems are solved, the monitor will display the screen when the power is turned on or the previous screen before "CHECK FILM BACK" is displayed.




**Power Saving System**

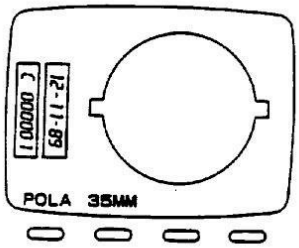
If photography and switch operation are suspended for more than 5 minutes, the power saving system will work. The monitor turns to the screen below, and "SLEEP" blinks.

- To restore the power, press one of the buttons indicated by the arrow.
- After the buzzer sounds, the monitor displays the screen, which appears when the power is first turned on.



**Selection of Photography Camera**

When the Polaroid back unit is detached and replaced with the camera back unit during photography, the following screen is displayed on the monitor. In this case, press the button below either name of back units to be used.




**Blink Detection Function**

This function is to prevent photography error by suspending photography if an examinee blinks at the moment the shutter release button is pressed. When this function works, the following performance will ensue.

① The flash lamp does not light.

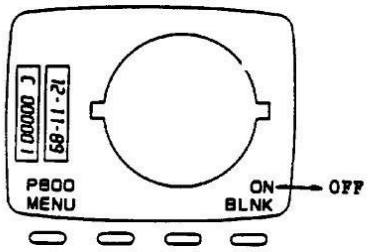
② The "BLINK" is displayed at the lower left on the monitor and it blinks for about 3 seconds. At the same time, the buzzer sounds.

③ The film counter does not advance and no exposed pictures come out.

To switch on or off this function, display the following screen on the monitor and press the button below "BLNK".

- The "ON" and "OFF" are displayed alternately every time when the button is pressed.

- Normally, it is recommended to keep this function on.



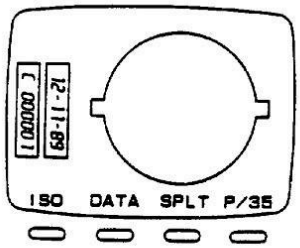

**Split Function**

This function should be off to disappear the split lines and the pole to support them from the monitor in the case of retinal observation through visible light.

Follow the procedure below to switch off this function.

1. Display the screen, which appears when the power is first turned on, (see the above screen) and press the button below "MENU".

   - The monitor displays the following screen.



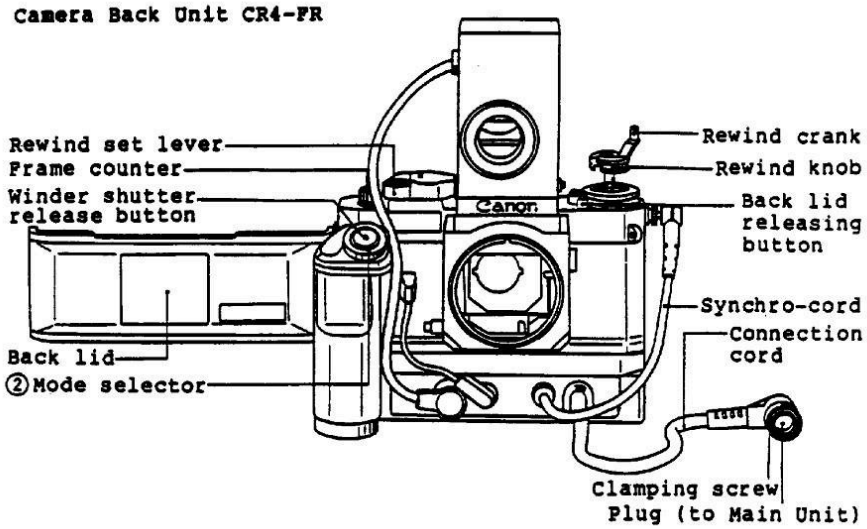

2. Press the button below "SPLT".

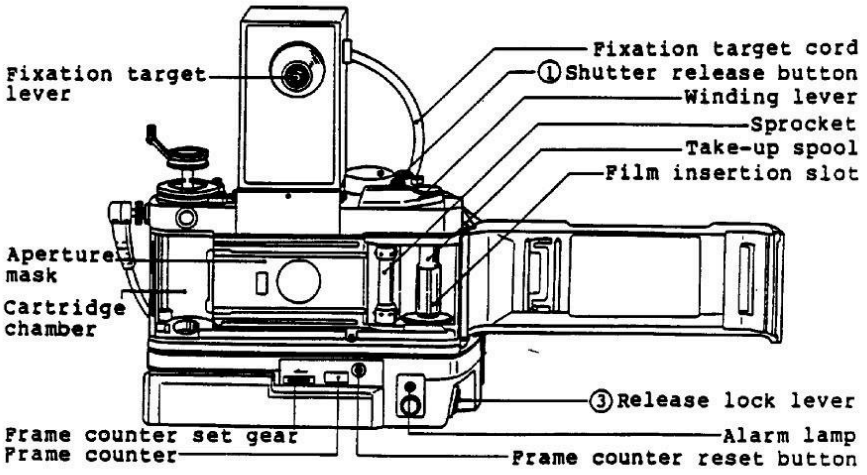
   - To restore the function, follow the same procedure as above. When a compensation lens is inserted (the diopter compensating slider is pulled), the split function will be off automatically.

## 4. 35mm PHOTOGRAPHY

**Description**

**Camera Back Unit CR4-FR**



Note: Parts which are not described in the above do not function as the components of the retinal camera and it is therefore not required to operate them. Further, normally the parts numbered from ① to ③ below should be set as shown when used.

| | | | |
|---|---|---|---|
| ① | Shutter release button | Set to A | L .... The shutter release button is locked.<br>S .... Self-timer |
| ② | Mode selector | Set to S | OFF .. The winder does not operate.<br>C .... When the winder shutter release button is pressed, the film advances continuously. |
| ③ | Release lock dial | Set to L | A .... Controlled by the mode selector setting, this button functions as shutter release button. |

**Camera Back Attachment/Detachment**

Follow the procedure below to attach the camera back to the main unit.

1. Turn off the power.

2. Insert the plug of the camera back into the receptacle on the main unit and turn the clamping screw fully clockwise.

3. Align the main unit positioning pin with the mount groove of the camera back, push the camera back against the main unit and lower the mounting lever.

4. To detach the camera back, reverse the procedure above.

**Cautions after Detachment**

1. If the detached camera back is left uncovered, dust and dirt may get inside the camera back as well as the main unit. Be sure to place the supplied dust cover over both mounts.

2. The mirror inside the camera back is longer than that of an ordinary camera. If a lens is attached to the camera back and the shutter release button is pressed, the mirror installed in the camera back will break. Do not try so.

**Film Loading**

The usable film is the 35mm film with ISO sensitivity (ASA) 64 - 400. Since the camera back does not work if detached from the main unit, load a film with the camera back attached to the main unit. For the film loading method, refer to the previous item.

1. Turn on the power.

2. Open the back lid of the camera back.

   - While pressing the back lid releasing button, pull up the rewind knob.
   - Pull up the rewind crank to make operation easy.

3. Insert a film cartridge into the cartridge chamber.

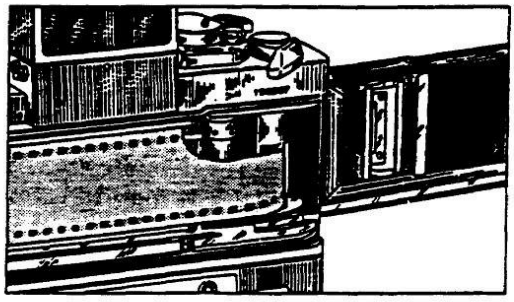
   - Press down the rewind knob so that its spindle is inserted into the cartridge.
   - If the rewind knob cannot be pressed down, lightly rotate the rewind knob clockwise or counterclockwise.

4. Put the film around the film take-up spool.

   - Insert the film end into the film insertion slot securely.
   - Press the shutter release button to wind the film one around.
   - Check that the film performations are engaged on the sprocket and spool tooth.

5. Remove the film slack.

   - Slowly turn the rewind crank clockwise.
   - Lay down the rewind crank.



Note 1: Do not press the aperture mask as it is easily deformed.

2: When the mode selector is set to off, the film can be wound by the winding lever.

3: If the film tries to be wound by pressing the shutter release button on the main unit the flash lamp will light. Do not press it during the film loading.

6. Press the shutter release button on the camera back to confirm that the film is properly wound up, and close the back lid.

- The back lid is automatically shut locked.

Note 1: When the film is advanced properly, the rewind knob turns counterclockwise. If not, load the film again from the beginning.

2: If film tries to be reloaded, take care that film leader is not rolled in. If this happens, the film cannot be loaded again.

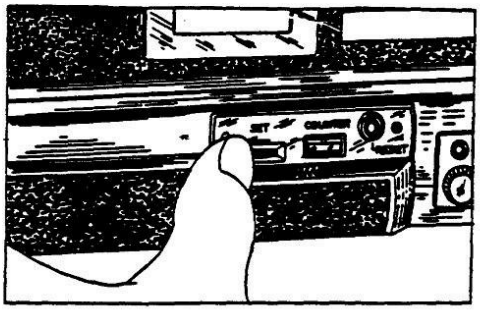
7. Press the shutter release button on the camera back until "1" is shown on the frame counter.

8. When "1" is shown, set the frame counter to "S".

- Press the frame counter reset button.

9. Set the frame counter to number of frames (12, 24 or 36) of the film to be used.

- Turn the frame counter set gear in the direction of the arrow while pushing it.



Note 1: If the frame counter is set to a larger number than the number of film frames actually used, the film may be severed. Therefore, the counter should be set accurately.

2: If the counter number is set wrongly, first, set the counter to "S". Then, set it to a correct number.

3: The number of the counter on the camera back increases and that on the winder decreases.

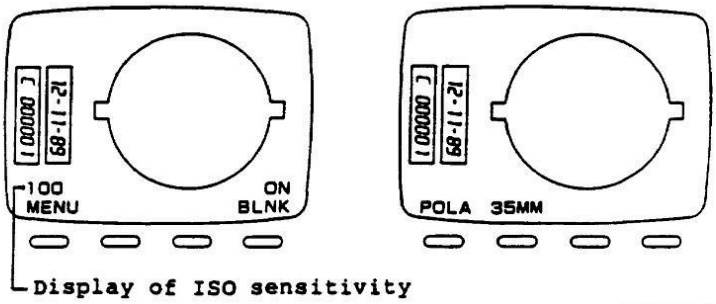
**Photography Procedure**

Since the basic operation for 35mm photography is the same as that for Polaroid photography, refer to the "Polaroid Photography" procedure.

1. Follow the procedure for "Polaroid photography", steps 2 and 3.

   - Set the light intensity adjusting knob to 4. (Standard intensity)

- When the power is turned on, the screen at the left is displayed on the monitor.




| Note: | When the Polaroid back unit is replaced with the camera back unit while in use, the screen at the right is displayed on the monitor. In this case, press the button below "35mm". |
|---|---|

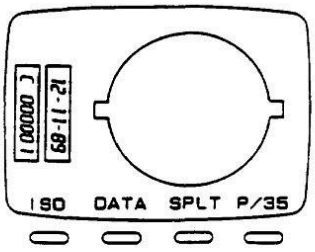
2. Confirm flash intensity.

- Looking at the screen which appears when the power is first turned on, confirm that the number above "MENU" is the same as ISO sensitivity of the loaded film.

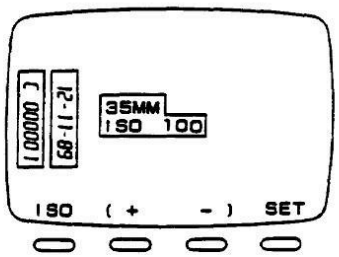
[If ISO sensitivity is different]

① While displaying the above screen, press the button below "MENU".

- The following screen is displayed on the monitor.



② Press the button below "ISO".




③ Press the button below "ISO".

o The ISO sensitivity changes to 100, 200, 400 and 64 on the monitor every time the button is pressed. Set the ISO sensitivity to that of the film to be loaded.

[Flash intensity compensating procedure]

(1) Display the screen shown for step 2 in the previous item.

(2) Press the button below "-" to decrease the intensity and the button below "+" to increase the intensity. In case of ISO 400, the flash intensity cannot be compensated.

④ After setting the flash intensity, press the button below "SET".

- The screen which appears when the power is first turned on is displayed and the set flash intensity (ISO sensitivity) blinks at the lower left.
- While the set flash intensity blinks, the power is being charged. When the display lights continuously, then it becomes possible to perform photography. (In the case P600 is displayed on monitor when power is turned on). Follow the procedure below.

  1. Press the button below "MENU".
  2. Press the button below "P/35".
  3. Press the button below "35mm".

3. Follow the steps from 6 to 16 for "Polaroid Photography".

- Chin rest height adjustment, external eye image/retinal image selection, height, forward/backward, left/right adjustment of the main unit, etc.

4. Press the shutter release button.

- The flash lamp lights, 1 frame is exposed, the film is wound up automatically and stops.
- The counter number and the data written on the data card are printed simultaneously.
- On every photography, the number on the counter decreases.

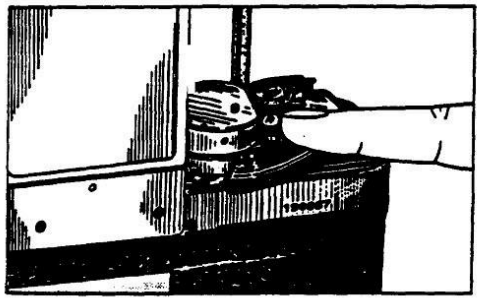
| Note: When the shutter release button on the camera back is pressed, the flash lamp does not light and the film is wound up. |
|---|

**Film Rewinding**

When the set number of film frames are exposed, the winder frame counter becomes zero and the alarm lamp lights. Although the shutter release button is pressed under this condition, photography is not taken and "CHECK FILM BACK" is displayed on the monitor. In this case, rewind the film by following the procedure below.

1. Press the frame counter reset button.

2. While rotating the rewind set lever in the direction of the arrow, push it in.



- The lever is locked in the state of being pushed.

> Note: When the lever is pushed in by mistake, lightly press the shutter release button on the camera back. The lever will return.

3. Pull up the rewind crank and turn it in the direction of the arrow.

- Rewinding sound is heard while the film is being rewound. Turn the rewind crank until the rewinding sound is no longer heard.

- The frame counters (on both the camera back and the winder) are not affected by the film rewinding.
- At the same time when the film is taken up by the take-up spool, the winder makes one wind-up operation and the alarm lamp goes out.

> Note: The rewinding can be made without pressing the frame counter. In this case, however, after completing the rewinding, the alarm lamp does not go out.
> To put the alarm lamp out, ① set the mode selector to OFF, ② return the winder counter to S, and ③ return the mode selector to S.

4. Open the back lid of the camera back and take out the exposed film.

- After confirming that the alarm lamp was out, open the back lid.
- If not performing photography continuously, close the back lid.
  For the opening/closing procedure of the back lid, refer to the steps for the film loading.

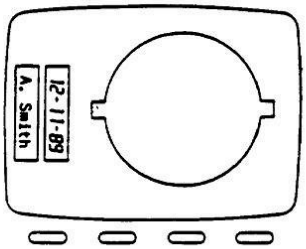
**Data Card Handling**

Describe data within the data card frame with thick pencil. Insert the data card into the data card insertion slot with the described side of a card facing the left. The described data is displayed on the left side of the monitor.

- Two of the following data; counter number, description on data card and auto-calendar record are displayed simultaneously on monitor. They are printed on film when the shutter release button is pressed.

When the data card is inserted, the data card description is displayed on the left data area. Further, to select either the counter number or the auto calendar record, display the screen shown for step 3.

- Whenever the button below "DISP CHANGE" is pressed, either data is displayed alternately on the right data area.




| Note: Data on left area is hidden by the data card. |
|---|

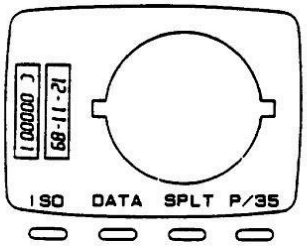
**Setting of Counter Number**

To change the counter number, follow the procedure below.

1. Display the screen, which appears when the power is first turned on.

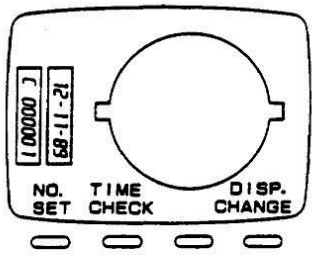
2. Press the button below "MENU".

   - The following screen is displayed on the monitor.



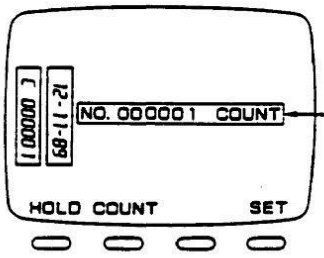
3. Press the button below "DATA".

- The following screen is displayed on the monitor.




4. Press the button below "NO. SET".

- The following screen is displayed on the monitor.

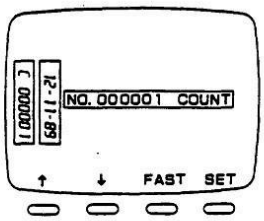



HOLD : The number will stay as it has been set.
COUNT: The number will increase on every photography.

- Press either of the buttons below "HOLD" and "COUNT".
- The display for the button pressed blinks.

5. When completing the setting, press the button below "SET".

- The following picture is displayed on the monitor:

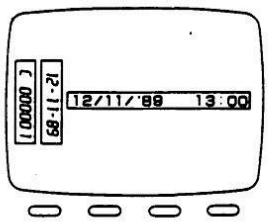



- The number is to be set in every two digit from the left.
- When the first upper two digits blink, set the desired number for them and press the button below "SET".
- When the number for the first 2 digits is finished setting, the next 2 digits will blink. Set the number in the same manner as the above successively.
- When the button below "↑" is pressed, the number will increase and when the button below "FAST" is pressed simultaneously, the pace will become fast.
- When the button below "↓" is pressed, the number will decrease.
- The counter figures flash in 2 digits simultaneously and they can be changed.
- After setting all 6 digits, press the button below "SET". The monitor shows the screen, which appears when the power is first turned on.

**Confirmation of Auto Calendar**

To check the auto calendar display, follow the procedure below.

- Display the screen for the step 3 in the item, "Setting of Counter Number", and press the button below "TIME CHECK".
- The following screen is displayed on the monitor. (To make a change, refer to "Setting of Auto Calendar".)



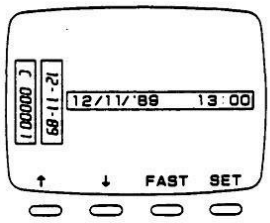

  - Confirm the auto calendar display.
  - After about 5 seconds, the screen returns automatically to the one which appears when the power is turned on.

## Setting of Auto Calendar

To change the date and time, follow the procedure below.

1. While pressing the shutter release button, turn on the power.

   - Continuously press the shutter release button until the following screen is displayed on the monitor.




   - While the first two digits for the year blink, determine the number and press the button below "SET".
   - Set the month, day, hour and minute in the same manner.
   - If no changes are to be made, simply press the button below "SET".
   - When the button below "↑" is pressed, the number will increase.
   - When the button below "↓" is pressed, the number will decrease.
   - When the buttons below "↑" and below "FAST" are pressed simultaneously, the pace will become fast.
   - When the buttons below "↓" and below "FAST" are pressed simultaneously, the pace will become fast.

   * Time is displayed in 24-hour system.

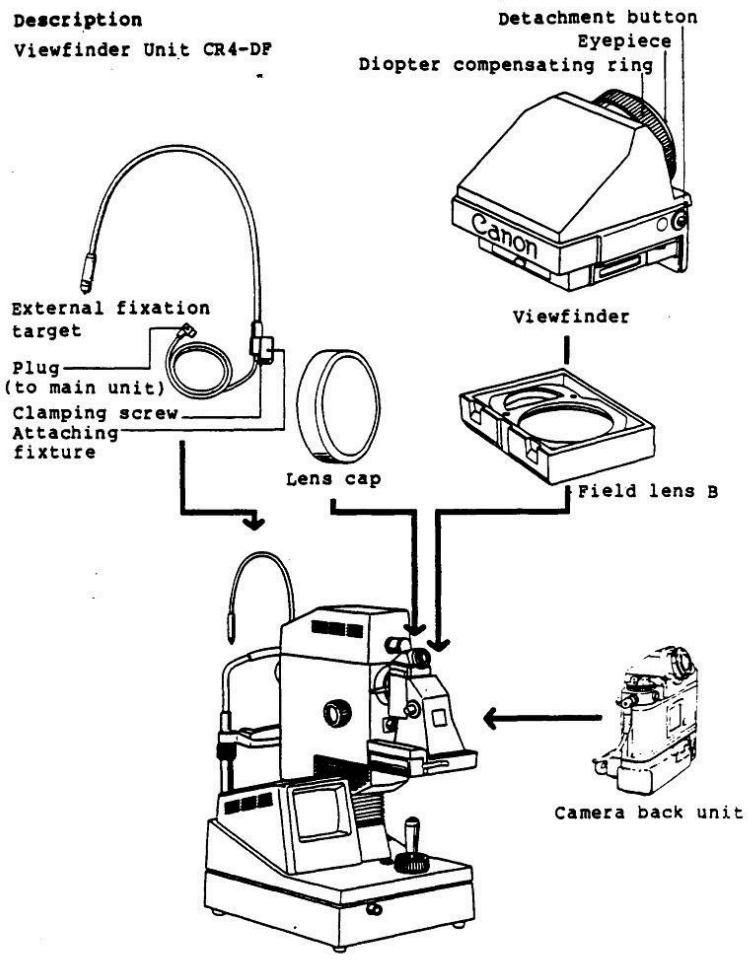
2. When the setting is completed, press the SET button.

   - The buzzer sounds, and the screen on the monitor returns to the one, which appears when the power is turned on and photography becomes ready.

## 5. RETINAL OBSERVATION THROUGH VISIBLE LIGHT

**Description**

Viewfinder Unit CR4-DF



Retinal observation through visible light can be made on either the Polaroid back unit or camera back unit.
For the retinal observation it is necessary to attach the viewfinder (replace with the fixation target box) and the external fixation target after dilation of the pupil to be tested.

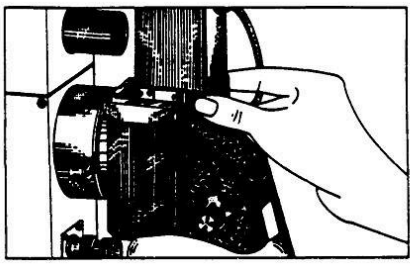
**Viewfinder Attachment/Detachment**

1. Turn off the power.

2. Detach the plug of the fixation target box from the Polaroid back unit or camera back unit.

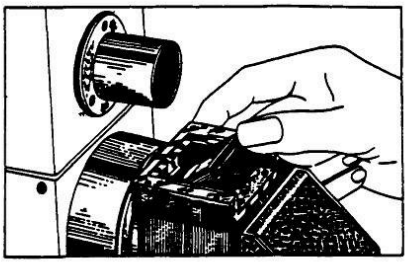
   o In case of the camera back unit, detach the camera back from the main unit first to perform the operation above.

3. While pressing the detachment buttons at both sides, pull the entire fixation target box.



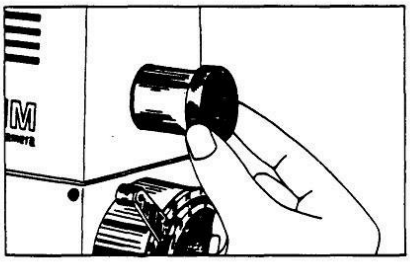
4. Insert the tip of finger nail into the Polaroid or camera back unit hollow and raise the field lens.

| Note: In removing the field lens, be careful not to give finger prints or scratches. |
|---|

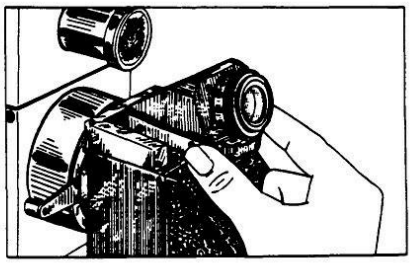


5. Insert one side of the field lens B under the retainer of the Polaroid back unit or camera back unit and press it down.

6. Remove the viewfinder cap and place it over the CCP camera lens of the main unit.



7. Align the rails (at both sides) of the viewfinder with the rail supports of the Polaroid back unit or camera back unit and press in the viewfinder until a click sound is heard.



**Reattachiment of Fixation Target Box**

The attachment method of the fixation target box is the same as that for the viewfinder. However, the fixation target cord should be connected with the either back unit.

**Cautions after Detachment**

If the fixation target box, the viewfinder, or the field lens, is left uncovered, dust and dirt may get inside the fixation target box, the viewfinder, as well as the back unit. Be sure to place supplied caps over the openings and put the field lens into a vinyl bag or the like.

**External Fixation Target Attachment/Detachment**

1. Turn off the power.
2. Fit the fixation target fixture to the upper side of the pole.
3. Tighten the fixture by rotating the clamping screws clockwise.
4. Insert the eye fixation target plug into the receptacle.
5. To detach the lamp, turn off the power and reverse the procedure above.

**Retinal Observation Procedure**

Except for the following operations, the procedure for retinal observation is the same as that for the Polaroid and 35mm photography. For the basic operation of the main unit, refer to the procedure for the Polaroid photography.

1. Turn the infrared filter knob counterclockwise.

   - The infrared filter gets out of the optical path.

2. Turn off the split function as necessary.

3. Adjust the viewfinder diopter.

   - Turn the diopter compensating ring from the ⊕ side and stop at a position where the cross hairs are clearly seen. (Diopter compensating range: +2 to -4D) If the viewfinder diopter is not adjusted to the examiner's vision, focusing may become incorrect.)

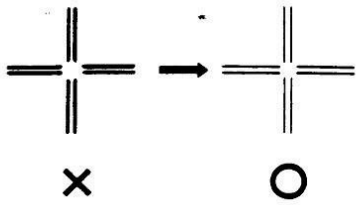
4. Have the examinee sit after making his pupil dilated with mydriatic drugs.

   - Ensure that the examinee's pupil has been sufficiently dilated.
   - Place the examinee's chin and forehead securely on the respective rests.

5. Focus the retinal image.

   - Turn the focusing knob while looking through the viewfinder.

- Adjust focusing so that the retinal image and cross hairs in the view are simultaneously seen clearly.



6. Determine the light intensity for observation.

7. When it is desired to perform photography consecutively, follow the procedure for the Polaroid or 35mm photography.

## 6. OTHERS

### Handling in Cold Climates

Sudden heating of the room in cold areas will cause condensation to form on the lenses and internal optical system. In this case, leave the CR4-45NM for at least 40 minutes after heating is turned on. Perform photography after condensation disappears.

### Objective Lens & Field Lens Cleaning

Use a piece of clean gauze (washed and dried), commercial lens cleaning paper, or a blower-brush.

1. When covered with dust or dirt:

   Wipe the lens surface lightly with a blower-brush.

> Note: Do not touch the brush to avoid smearing the lens with hand grease.

2. When smeared by fingerprints or grease:

   Brush off the dust or dirt on the lens surface, and wipe the surface lightly with a clean gauze or lens cleaning paper soaked in a mixed solution of 2 parts of absolute alcohol to 8 of ether. Other than the above solution, effective and easy-to-use commercial solutions can be recommended. Contact a Canon representative or distributor.

> Note 1: If the lens is wiped when covered with dust or rubbed too strongly, it may be scratched. In addition, if soaked excessively, the surface may be unevenly cleaned.

2: Disifecting alcohol contains water. If the lens is wiped with it, the surface will be damaged and therefore, never use it.

- If the infrared filter is out of the optical path when cleaning the objective lens, dust or dirt on the surface of the objective lens can be seen. Clean the objective lens by following the procedure below.

  1. Turn on the power.

  2. Turn the infrared filter knob counterclockwise. (The infrared filter gets out of the optical path.)

  3. When completing the cleaning, turn the infrared filter knob clockwise.

## 7. SERVICE INFORMATION

For information on overhaul or other services, contact a Canon representative or distributor.

## 8. SPECIFICATIONS

| | |
|---|---|
| Type: | Non-mydriatic type |
| Picture angle: | 45° (at 0 diopter) |
| Image size: | ø72mm on a Polaroid film |
| | ø22mm on a 35mm film frame |
| Required pupil diameter: | 4.0mm or more |
| Examinee's diopter compensating range for photography: | -12 to +15D.: without compensating lenses (Applicable range of split line focusing)<br>-7 to -33D.: with negative compensating lens<br>+11 to +35D.:" with positive compensating lens |
| Positioning of a pupil: | ø50mm area of the external eye can be observed on TV monitor. Split image system is applied to the ø20mm area of the pupil, and working distance preadjustment is possible by aligning split images. |
| Focusing: | By aligning the split lines on the retinal image (-12D to +15D.); (Split lines can be set off.) |
| Working distance adjustment: | By using flickering corneal reflection dots |
| Blink detection system: | Function to prevent flash when the examine blinks. (This system can be switched off.) |
| Light source: | For observation:<br>12V 75W Halogen lamp<br>(through infrared filter)<br>For photography:<br>300V300Ws rated Xenon flash lamp |
| Fixation target: | Incorporated through the optical system and can be observed on the TV monitor. |

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| | |
|---|---|
| Data printing: | Two of the following data can be printed on 35mm film:<br>Description on exclusive plastic card, 6-digit ID. number, auto-calendar |
| TV camera and monitor: | CCD camera; 5 in. black & white TV monitor built-in |
| Film used: | Polaroid High Speed Land Film 600 or Type 779; 35mm film ISO (ASA) 64 to 400 |
| Power supply: | Designed according to the area used.<br>120V, 60Hz, 240VA |
| Dimensions & weight: | With a Polaroid back unit<br>324 (W) x 545 (L) x 590 (H) mm<br>27.0 kg approx.<br>(13" x 21" x 23" approx.<br>60 lbs. approx.)<br>With a 35mm camera back unit<br>324 (W) x 510 (L) x 590 (H) mm<br>27.0 kg approx.<br>(13" x 20" x 23" approx.<br>60 lbs. approx.) |

9. COMPONENTS

Main unit ..... 1
Power cord ..... 1
Data card ..... 5
Cap (for objective lens, camera mount) ..... 1 each
Dust cover ..... 1
Chin rest paper ..... 100
Blower brush ..... 1
Spare lamp (for observation illumination) ..... 1

## 10. OPTIONAL ACCESSORIES

1. Polaroid color back unit CR4-PC
2. 35mm camera back unit CR4-FR
3. Viewfinder unit CR4-DF (For retinal observation through visible light)
4. External fixation target CR4-FL
5. Chin paper CR4-AP
6. Motorized table
7. Motorized chair
8. Main unit case CR4-MC
9. Data card CR4-DC (A set of plastic cards, 100 pcs.)
10. Slide viewer CR-SV
11. Slide viewer stand CR-VS

• The viewfinder unit CR4-DF includes an external fixation target.

Polaroid is a trademark of Polaroid Corporation.

**Information**

This equipment generates and uses radio frequency energy and if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, may cause interference to radio and television reception. It has been type tested and found to comply with the limits of ISM equipment in accordance with the specifications in Part 18 of FCC Rules, which are designed to provide reasonable protection against such interference in hospitals or health-care facilities. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures.

- Reorient the receiving antenna.
- Relocate the equipment with respect to the receiver.
- Move the equipment away from the receiver.
- Plug the equipment into a different outlet so that equipment and receiver are on different branch circuits.

If necessary, the user should consult the dealer or an experienced radio/television technician for additional suggestions. The user may find the following booklet prepared by the Federal Communications Commission helpful: "How to Identify and Resolve Radio-TV Interference Problems".

This booklet is available from the U.S. Government Printing Office, Washington, DC 20402, Stock NO.004-000-00345-4.